

25 MAR 1980

MEMORANDUM FOR: Deputy Chief, Real Estate & Construction
Division, OL

FROM:

Chief, Headquarters Engineering Branch,
RECD/OL

SUBJECT: Use of Computer Room Heat to Warm the
Domestic Water

REFERENCE: Memo ODP-0-127, 30 Jan 80, subj as above

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28 MAR 1980

1. The heat given off by the various computer and communications systems is presently removed from those systems by air handlers served by chilled water which is produced in the Powerplant about a thousand feet west of the Headquarters Building. Essentially the computer heat is transferred to the air in the computer room which in turn is transferred to the chilled water system, raising the chilled water from approximately 45°F to about 55°F. The chilled water is then pumped to the Powerplant to a chiller where the heat is transferred to an evaporative cooling tower for a discharge to the atmosphere. In this entire cycle, the only "warm" medium is the water circulated from the chiller to the evaporative cooling tower at the Powerplant. And this water only reaches a temperature range of 85°F to 90°F.

2. The domestic hot water in the Headquarters Building is generated by taking part of the main water supply to the building and heating it using steam heat exchangers. The heat exchangers are located in mechanical equipment areas with each exchanger servicing a particular part of the building.

3. Under this design arrangement the heat removed from the computer rooms does not become concentrated in any amount that would be considered "warm" until it reaches the Powerplant and at that point it is too far away to be useable to warm part of the main water supply.

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SUBJECT: Use of Computer Room Heat to Warm the Domestic Water

4. Two more factors should also be discussed. First, the only consideration I am aware of that would alter the present boiler operation plan of continuous service is the preliminary examination of a project to install small "summer" boilers to serve the Headquarters cafeteria and Printing and Photography Building and to install electric hot water heaters for scattered photo processors, medical services, and similar requirements. The goal of this project would be to supply the small minimum hot water requirements while allowing the large boilers in the Powerplant to be secured. This would be seasonal for possibly to period of July through August. No energy would be used to heat general domestic water under this plan during the July - August period.

5. Second, during the summer the domestic water temperature tends to rise naturally into the low to middle 70's which is not hot but is possibly acceptable for rest room room purposes.

6. I hope the above information will help to understand our present system and encourage them to continue to look for ways to save energy.

MEMORANDUM FOR: Joe Hart, ES/SAAC

FROM:

Chief, Plans and Program Staff

SUBJECT: Employee Suggestion No. 80-211
Energy Conservation (Window Shutters)

1. The suggestion accurately points out that the Headquarters building, similar to virtually all buildings in the U.S., was designed and constructed during times when energy conservation did not command the urgency it does today. Energy is now expensive, both economically and politically, and the nation is now struggling to establish control on the expenditure of energy. Applicable to the suggestion, the DOE and the GSA, in cooperation with this Agency, are analyzing the alternatives to retrofit our buildings to best achieve energy saving objectives.

2. The Headquarters building is under GSA control. The GSA is responsible to the DOE to achieve energy saving goals through improved operating procedures and through the capital expenditure for energy efficient equipment. Our Agency is responsible to insure our support requirements consider the need to conserve, and we are responsible to cooperate with the GSA in identifying and implementing policies, procedures and ideas. The DOE, the GSA and the Agency have been active over several years in the energy area, there are numerous committees, a plethora of ideas, and energy saving options literally inundate the resources available for study and implementation. The DOE publishes hundreds of options for consideration, and requires the GSA to perform an energy audit of buildings. The audit is to form the foundation for the systematic implementation of prioritized energy saving projects, as the audit identifies costs, energy savings and payback periods for each option. This audit has been done, and has included the following specifics for windows:

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- a. Double glazing
- b. Triple glazing
- c. Solar films on windows
- d. Blinds, drapes, shades, louvers and screens

In analyzing the above options, the following was recommended by the consultant: "Whichever option is chosen for window treatment should not depend on individual control for the energy savings to be realized." It should be noted that significant savings could now be realized if individual occupants could be depended on to use the blinds and curtains presently installed to conserve energy. In installations where draperies are automated, individuals tend to override the controls in order to meet their own needs, similar to the constant attempt to adjust thermostats in the Headquarters building to meet individual temperature preferences.

3. The GSA and engineers from RECD/OL are working together in analysing the audit report while concurrently implementing projects achievable with existing resources; therefore, the consultant's recommendation concerning the dependency on occupants to save energy is under review.

4. The above narrative is presented as background information, primarily to identify that the energy conservation field is dynamic with ideas everywhere, and that the challenge is to systematically and competitively rank options and thereby institute a program consistent with national goals and internal resources. The narrative is also presented to indicate that the concept of shutters was considered, but not in detail because they depended on the cooperation of the individual occupants of windowed rooms. Shutters may be chronologically premature in that there is not yet universal agreement on the depth and severity of the energy crisis, whether the crisis is real or political, and there is no agreement as to what degree of "bleeding" is fair and necessary. Experience has been that people are not terribly cooperative on voluntary inconveniences. In any event, the energy audit did identify numerous energy saving projects with higher priority for our limited capabilities (resources) than window glazing, films, blinds, drapes, shades, louvers and screens, although some window modification will eventually be accomplished. FYI, given the revised operating procedures of lower wintertime building temperatures, higher summertime temperatures, securing perimeter units at night and better heating, ventilating and air conditioning control, the consultant identified relatively long pay back periods for window attention, other than caulking.

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5. The above suggests it would be most difficult to evaluate the suggestion on the basis of tangible savings because it is but one option among hundreds, its premise has been rejected because effectiveness is dependent on the cooperation of room occupants, and the suggestion is not competitive with other options immediately competing for our limited resources. Analysis of the specifics of the suggestion clearly lead to a recommendation to decline because of the following:

a. The construction as identified in the suggestion could not be approved by the OS because fiberglass/Styrofoam represents a fire/safety hazard.

b. Achieving an air tight seal would be considerably more difficult and expensive than implied in the suggestion.

c. Aesthetics would be controversial, also achieving the cooperation of personnel to close the shutters could be a problem.

d. The shutters would protrude into the room, assuming the blinds would remain and the curtains removed (blinds necessary for summertime reflection of sunlight to reduce heat gains). However, safes and furniture cover a portion of a high percentage of the windows, precluding the full opening of the shutters. It is anticipated shutters would be damaged by hitting safe edges, etc. Maintenance costs are difficult to estimate, but experience would demand that the shutters be fabricated and installed to be extremely durable, or damage and maintenance costs will be high.

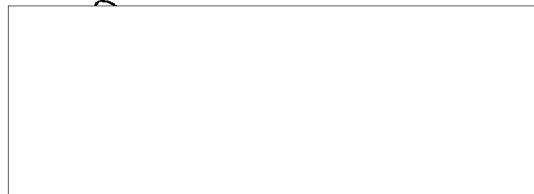
6. With elevated summertime building temperatures and the nighttime securing of our perimeter systems and select air conditioning systems, summertime savings through use of the shutters would not be significant and, on balance, may even be negative -- re, the shutters may prevent some building heat from escaping to the cooler nighttime outside air. It may be noted that 80% of the sun's heat load is via radiation transmitted directly through the glass to the interior; therefore, significant summertime savings could be achieved by keeping the shutters closed when the sun is out, but it is doubtful that our personnel would be willing to voluntarily transform their windowed offices into, in essence, an interior room via closing the shutters.

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7. In summary, the design and custom manufacture and installation of a durable, efficient and safe shutter would be considerably more difficult and expensive than identified in the suggestion (additionally, manufacturer and installation would be via GSA contract, with attendant overhead charges). The installation would be aesthetically controversial and energy effectiveness would depend on the cooperation of office occupants. The costs and benefits in competition with other options to save energy lead to the recommendation that this suggestion be declined for use in the Headquarters building at this time. If energy continues to become more scarce and expensive at the present rate, and if requirements to reduce energy consumption by a percentage each year continues, and as the more effective alternatives become implemented, then no doubt some form of window treatment will be done.

8. The use of shutters over double or triple glazing, blinds, draperies, etc., would depend on the attitude of our personnel at that time, their cooperativeness, and the relative costs involved. The time for shutters as a retrofit option has not yet come, but may be here in the future.

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TITLE OR SUBJECT OF SUGGESTION Energy Conservation at Hqs and other CIA Federal Bldgs (Window Shutters)		SUGGESTION NO. 80-211
PRESENT METHOD See Attachment		
SUGGEST See Attachment		
ADVANTAGES See Attachment		
FORM 244 (3/79)	USE PREVIOUS EDITIONS	<input type="checkbox"/> DCL <input type="checkbox"/> RVW DRV _____ BY _____
CLASSIFY AS APPROPRIATE		

CL C 1241

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ROUTING AND RECORD SHEET

SUBJECT: (Optional) Energy Conservation (Window Shutters)
Employee Suggestion No. 80-211

FROM:

NO.

OL 0 1241 a

DATE

7 APR 1980

TO: (Officer designation, room number, and building)

DATE

RECEIVED

FORWARDED

OFFICER'S INITIALS

COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)

1. James H. McDonald
DL/OL

7 APR 1980

[Signature]

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15.

FYI as Energy Chairman,
the attached suggestion
will be filed with other
energy related suggestions
for the next committee
meeting.

I went into considerably
more detail than normal
due to the fact that the
suggestor sent copies
of his suggestion to the
DCI and to D~~E~~/NFAC.

Handwritten note:
"Handed to [unclear]
for Energy Com."

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SUGGESTION

I. The Problem

Energy conservation is a key national priority, yet the CIA headquarters building is a heat sieve designed and built in the era of cheap and inexhaustible energy. On the 1st, 3rd, 4th, 5th, and 6th floors there are nearly 3,500 windows, each one of which loses about 2.75 million btu's per heating season, requiring the burning of 25-28 gallons of heating oil per window per heating season. About 80 percent of this heat loss is pure waste. At today's oil prices of roughly \$1-/gallon this amounts to a cost of \$20/window/year or \$70,000. Since heating oil prices promise to double in the next 2-3 years, savings would amount to about \$150,000 per year in the mid 1980s. Summer air conditioning savings would also be sizeable, perhaps \$50,000 to \$75,000.

II. The Solution

Because of the large number of identical windows, it will be possible to mass produce styrofoam insulated shutters to fit on the inside of each of these windows. These shutters would not interfere with the operation of the windows or illumination during working hours, nor would they intrude on available space within agency offices. Closing of these shutters could be made a portion of the normal daily security check, thus assuring a 90 percent reduction in heat losses during the 75 percent of the week that most offices are normally unoccupied. Since heat losses are much higher at night than during the day, in part because of radiation losses, overall savings would average 80 percent or so.

III. The Shutters

These proposed shutters would hinge on each side of the windows on the inside and open against the concrete columns alongside each window, much like french or double doors. Shutter construction would probably call for a styrofoam core bonded to fibreglass or plastic sheets (much like high quality ice chests are manufactured) with weather stripped closures. Design should aim at an "R" value of 8 to 10 per shutter, implying a core

thickness of about 1 1/2". Based on a competitive bid order of some 3,500 units, costs should run less than \$50- per unit. Installation costs should not exceed an additional \$50 per unit. A particularly cheap, but less esthetically pleasing solution could be obtained by using lift out styrofoam panels with magnetic catches that would seal on the window frames. This could probably be done for as little as \$10-\$20 per window, with a payback period of less than one heating season. These lift-out panels would also be useable on the 2nd and 7th floors.

IV. The Payoff

With annual savings on heat alone of \$20-/window (probably \$30-\$40/window taking into account air conditioning savings and the probable rise in fuel costs during the interim) payback could be obtained in 3 years or less. Total annual savings would total at least \$100,000 next year in heating costs and more than \$150,000-/year during the 1980s. Other conservation investments could be made on the 2nd and the 7th floor where heat losses through the windows are greater even than on the other floors. Again, insulated shutters of some kind probably offer the best solution. Double glazing would be more expensive and would save only about 50 percent at best, compared to the 80 percent or so available from shutters. As for the cafeteria, which is an energy disgrace, no solution suggests itself. For your information, it probably takes more energy to heat this area than it does for the entire rest of the headquarters complex.